REMARKS

Applicants have amended and canceled claims in view of the restriction requirement discussed below. In particular, Applicants have amended their claims as necessary to limit A to (A1) and have canceled Claims 29 and 32-37 as outside the scope of the elected claims. Applicants reserve the right to file one or more divisional applications directed to the non-elected subject matter.

Restriction Requirement under 35 U.S.C. 121

The Office Action requires restriction to one of the following groups:

Group I:	Claims 20-22, 24-28, and 30, drawn to compounds of formula (I) in which L is L1 and A is formula (A1), as well as compositions containing such compounds
Group II:	Same as Group I except that A is formula (A2) or (A3)
Group III:	Same as Group I except that A is formula (A4) or (A15)
Group IV:	Same as Group I except that A is formula (A5)
Group V:	Same as Group I except that A is formula (A6) or (A7)
Group VI:	Same as Group I except that A is formula (A8), (A9), or (A13)
Group VII:	Same as Group I except that A is formula (A10) or (A11)
Group VIII:	Same as Group I except that A is formula (A12)
Group IX:	Same as Group I except that A is formula (A14)
Group X:	Same as Group I except that A is formula (A16)
Group XI:	Same as Group I except that A is formula (A17)
Group XII:	Claims 20-22, 24-28, and 30, drawn to compounds of formula (I) in which L is L2, L3, or L4 and A is formula (A1), as well as compositions containing such compounds
Group XIII:	Same as Group XII except that A is formula (A2) or (A3)
Group XIV:	Same as Group XII except that A is formula (A4) or (A15)
Group XV:	Same as Group XII except that A is formula (A5)
Group XVI:	Same as Group XII except that A is formula (A6) or (A7)
Group XVII:	Same as Group XII except that A is formula (A8), (A9), or (A13)
Group XVIII:	Same as Group XII except that A is formula (A10) or (A11)
Group XIX:	Same as Group XII except that A is formula (A12)
Group XX:	Same as Group XII except that A is formula (A14)
Group XXI:	Same as Group XII except that A is formula (A16)

Group XXII: Same as Group XII except that A is formula (A17)

Group XXIII: Claim 29, drawn to a process for making compounds of formula (I)

Group XXIV: Claim 31, drawn to a method of using compounds of formula (I)

Group XXV: Claim 32, drawn to a process for preparing compositions containing compounds of formula (I)

Group XXVI: Claim 33, drawn to a compound of formula (III-b)

Group XXVII: Claim 34, drawn to a compound of formula (II-a)

Group XXVIII: Claim 35, drawn to process for making a compound of formula (II-a) of Claim 34

Group XXIX: Claim 36, drawn to a compound of formula (XII)

Group XXX: Claim 37, drawn to a compound of formula (XII) of Claim 36

The Office Action also requires an election of a single disclosed species from the elected group for the purpose of initial examination.

Applicants elect Group I (which includes Claims 20-22, 24-28, and 30 to the extent that L is L1 and A is formula (A1)) with traverse with respect to Group XII (which includes Claims 20-22, 24-28, and 30 to the extent that L is L2, L2, and L3 and A is formula (A1)) and with respect to Group XXIV (which includes method of use Claim 31) but without traverse with respect to the other Groups. Applicants' traversal with respect to Group XII is based on the generally accepted structural and chemical relationship between thiophene and thiophenyl-containing compounds and corresponding benzene and phenyl-containing compounds. E.g., D.J. Cram and G.S. Hammond, *Organic Chemistry*, Second Edition (New York: McGraw-Hill Book Company, 1964) at pages 582 and 585 (enclosed). Applicants' traversal with respect to Group XXIV is based on the well established inseparability of a compound from its properties, including biological properties. See *In re Papesch*, 325 F.2d 381, 137 U.S.P.Q. 43 (C.C.P.A. 1963).

Applicants elect the species represented by the compound of Example 6, upon which all of the pending claims except Claims 26 and 28 are readable. The preparation and depiction of the structure of this compound can be found in the specification at pages 40-41 and test data for this compound can be found in Tables A through D (see Use Examples at pages 45-56). This election is without traverse to the extent that it is understood that (a) the restriction requirement will be withdrawn upon the finding of an allowable genus and (b) any species withdrawn

from consideration will be transferred to the elected subject matter unless it is found patentably distinct from the elected or allowed claims.

In view of the preceding amendments and remarks, allowance of the claims is respectfully requested.

Respectfully submitted,

By _____
Richard E. L. Henderson
Attorney for Applicants
Reg. No. 31,619

Bayer CropScience LP
2 T.W. Alexander Drive
Research Triangle Park, NC 27709
Ph: 919-549-2183
Fax: 919-549-3994
Q:patents/prosecution document/cs8774/8774 amendment 9-23-08

ORGANIC CHEMISTRY

Donald J. Cram
PROFESSOR OF CHEMISTRY, UNIVERSITY OF CALIFORNIA AT LOS ANGELES

George S. Hammond
PROFESSOR OF CHEMISTRY, CALIFORNIA INSTITUTE OF TECHNOLOGY

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(1964)

Heterocyclic Compounds

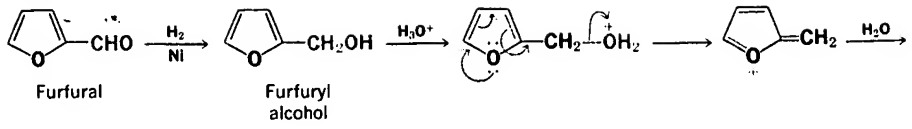
Organic compounds that contain rings composed of carbon and other atoms such as oxygen, sulfur, nitrogen, or phosphorus are called *heterocyclic compounds.* Rings of this sort are frequently encountered in natural products, and many biologically important compounds are *heterocycles.* Some of these substances exhibit special chemical properties, particularly when the ring systems are highly unsaturated, or contain less than five atoms. The importance of heterocyclic compounds, coupled with their somewhat special nomenclature, physical properties, and reactions, justifies their treatment in a special chapter. The subject also provides a good vehicle for developing synthetic sequences with reactions presented in earlier chapters.

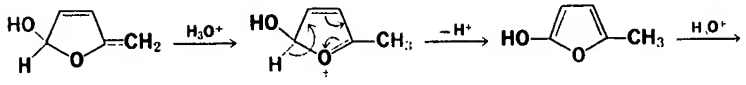
Many of the simpler heterocyclic compounds such as ethylene oxide and propiolactone have been discussed earlier. This chapter is devoted largely to the common five- and six-membered heterocycles.

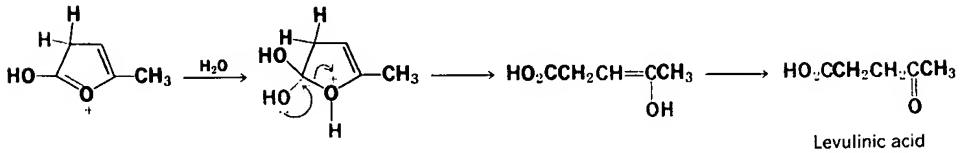
Five-membered Rings

Table 25.1 lists unsaturated five-membered heterocyclic compounds. These ring systems display varying degrees of resemblance to benzene in their physical and chemical properties, with thiophene occupying the position closest to benzene. Thus, thiophene and benzene boil at 84 and 80°, respectively. They both undergo addition and electrophilic substitution reactions.

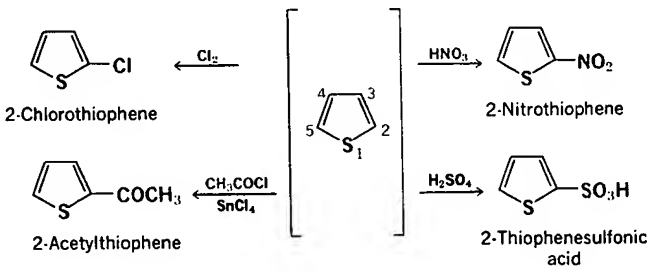
These similarities and others are rationalized as follows: (1) Unsaturated five-membered ring compounds all possess molecular weights close to that of benzene. (2) They are planar, and their molecular volumes and shapes resemble those of benzene. (3) The p orbitals of the double bonds (page 128) and those of the hetero atoms overlap to form doughnut-shaped molecular orbitals above and below the plane of the nuclei (Fig. 25.1). The resulting resonance of stabilization (page 140) amounts to 23, 31, and 31 kcal/mole for furan, pyrrole, and thiophene, respectively, as compared to 39 kcal/mole for benzene.



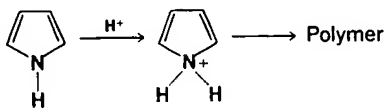




Reactions or Furan, Thiophene, and Pyrrole. The reactions of thiophene show a marked resemblance to those of benzene except that the heterocycle undergoes substitution under milder conditions. The 2,5-positions are more amenable to electrophilic attack than the 3,4-positions, and substitution occurs at the latter places only if the other two are blocked.



Pyrrole is a weaker base than aniline. The aromatic character of the substance is destroyed by addition of acids, and the diene produced polymerizes. This fact prohibits application of many of the common electrophilic substitution reactions to pyrrole.



Pyrrole is also a weak acid, whose conjugate base is stabilized by delocalization of negative charge, in much the same way as in the phthalimide anion (page 211). A number of observed *electrophilic substitutions* of pyrrole probably involve this anion as an intermediate.